US 20170026156A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2017/0026156 A1**

(43) **Pub. Date: Jan. 26, 2017**

THOMAS et al.

(54) **HIGH RESOLUTION CHANNEL SOUNDING FOR FDD COMMUNICATIONS**

(71) Applicant: **Nokia Solutions and Networks Oy**, Espoo (FI)

(72) Inventors: **Timothy THOMAS**, Palatine, IL (US); **Frederick VOOK**, Schaumburg, IL (US); **Weidong YANG**, San Diego, CA (US)

(73) Assignee: **Nokia Solutions and Networks Oy**, Espoo (FI)

(21) Appl. No.: **15/039,501**

(22) PCT Filed: **Oct. 22, 2014**

(86) PCT No.: **PCT/EP2014/072637**

§ 371 (c)(1),
(2) Date: **May 26, 2016**

Related U.S. Application Data

(63) Continuation of application No. 14/103,197, filed on Dec. 11, 2013, now abandoned.

Publication Classification

(51) **Int. Cl.**

H04L 5/00	(2006.01)
H04W 72/12	(2006.01)
H04W 72/04	(2006.01)
H04L 5/14	(2006.01)

(52) **U.S. Cl.**

CPC ***H04L 5/0051*** (2013.01); ***H04L 5/14*** (2013.01); ***H04L 5/0007*** (2013.01); ***H04W 72/1289*** (2013.01); ***H04W 72/0446*** (2013.01)

(57) **ABSTRACT**

A method includes scheduling a selected UE operating in a FDD mode to transmit sounding information on a downlink carrier frequency using selected resource(s) from a downlink radio frame, and communicating using the downlink radio frame by transmitting to UEs in resources other than at least the selected resource(s) and by receiving the sounding information on the downlink carrier frequency from the selected UE in the selected resource(s). Another method includes scheduling a selected UE operating in a FDD mode to receive sounding information on an uplink carrier frequency using selected resource(s) from an uplink radio frame, and communicating using the uplink radio frame by receiving from UEs in resources in the uplink radio frame other than at least the selected resource(s) and by transmitting the sounding information on the uplink carrier frequency to the selected UE in the selected resource(s). Apparatus and computer program products are also disclosed.